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## PATENT SPECIFICATION



Convention Date (Switzerland): Aug. 9, 1918.

131,299

Application Date (in United Kingdom): Aug. 11, 1919. No. 19,750/19.

Complete not accepted.

### COMPLETE SPECIFICATION.

#### Improvements in or relating to Aluminium Solders.

We, SOCIÉTÉ ANONYME DES LAMINOIRS ET CABLERIE, of Cossonay-Gare, Switzerland, Assignees of GUSTAVE FERRIERE, and SIEGFRIED PFYFFER, of Zurich, Switzerland, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

Aluminium solders are known which do not require any blow lamp flame and can be used simply with the soldering iron. A well-known solder contains for instance 60% tin, and also silver, copper, aluminium, lead, zinc, cadmium, and antimony.

It has been found that by increasing the proportion of tin in the mixture to at least 63%, the complicated method of manufacture and composition becomes unnecessary, and an aluminium solder which can be applied by means of a soldering iron, can be made from only two metals, namely tin and silver, or tin and zinc, the presence of either of these two metals, zinc and silver, giving the solder the necessary adhesion. In order to increase the hardness of the solder, it could be given with advantage an addition of copper if it be made of tin and silver, or of copper and lead or copper and silver if it be made of tin and zinc; the object of lead and silver in this case being to ensure a perfect alloying, as copper does not alloy itself completely with tin. In order to increase fluidity, the solder could be further given an addition of cadmium or bismuth. The solder thus contains at least two, and at the outside four metals

and thus differs advantageously from well known solders. An important advantage of the new solder consists in the fact that it does not require any fluxes, and that the aluminium surfaces to be soldered need not be cleaned, as carefully as in the case of other solders, a simple mechanical or chemical cleaning being sufficient in order to ensure proper adhesion of the solder. The new solder is suitable for aluminium, as well as for aluminium alloys, such as for instance duralumin.

Of the two metals ensuring adhesion, silver should be used when the articles are intended to be electricity conductors or vessels for boiling water or for distilled water.

For instance, a solder made of:—

|                   |    |
|-------------------|----|
| 86% tin,          |    |
| 0.5—13.5% copper, |    |
| 0.5—13.5% silver, | 60 |

is very suitable for electric conductors, owing to its great resistance to the effects of electric current on soldered joints.

A very durable solder has for instance the following composition:—

|        |   |   |   |   |          |
|--------|---|---|---|---|----------|
| Tin    | - | - | - | - | 72—87%   |
| Zinc   | - | - | - | - | 10—25%   |
| Lead   | - | - | - | - | 0.5—2.5% |
| Copper | - | - | - | - | 0.5—2.5% |

As no lead should be used for cooking vessels, the solder for these could be made for instance as follows:—

|        |   |   |   |   |          |
|--------|---|---|---|---|----------|
| Tin    | - | - | - | - | 85—95%   |
| Zinc   | - | - | - | - | 0.5—9.5% |
| Silver | - | - | - | - | 0.5—4.5% |
| Copper | - | - | - | - | 0.5—4.5% |

For cheap articles will be used:  
65—90% tin and 10—35% zinc.

In certain cases it will be necessary to have a very fluid solder, for instance for closing in an air-tight manner ~~con-~~  
serve tins. If the colour of the solder is immaterial, a solder with the following proportions will be used:—

|    |         |   |   |   |   |          |
|----|---------|---|---|---|---|----------|
|    | Tin     | - | - | - | - | 92%      |
| 10 | Silver  | - | - | - | - | 0.5—7.5% |
|    | Bismuth | - | - | - | - | 0.5—7.5% |

In the contrary event, if the colour of the solder must be that of the aluminium, the following will be used:—

|    |         |   |   |   |   |           |
|----|---------|---|---|---|---|-----------|
| 15 | Tin     | - | - | - | - | 63—78%    |
|    | Silver  | - | - | - | - | 20—25%    |
|    | Cadmium | - | - | - | - | 0.5—14.5% |

The above mentioned solders have all the advantage of not requiring any special preparation of the surfaces to be soldered, which have merely to be mechanically or chemically cleaned. They are moreover very strong, and nevertheless do not require the use of a blow lamp flame, as the soldering can be done by means of an ordinary soldering iron.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A solder for aluminium, characterised by the point of fusion of the solder being lowered as far as possible by the addition of at least 63% of tin, whilst the power of adhesion of the solder is ensured by the addition of a metal with strong

power of adhesion, for the purpose of enabling the soldering to be done with the soldering iron, without a flux and without any special preparation of the aluminium.

2. A solder such as set forth in Claim 1, in which the metal ensuring adhesion, is silver.

3. A solder such as set forth in Claim 1, in which the metal ensuring adhesion, is zinc.

4. A solder such as set forth in Claims 1 and 2 characterised by the addition of copper, for the purpose of increasing the rigidity of the solder.

5. A solder such as set forth in the Claims 1 and 3 characterised by the addition of a mixture of copper and lead, for the purpose of increasing the rigidity of the solder.

6. A solder such as set forth in the Claims 1 and 3 characterised by the addition of a mixture of copper and silver, for the purpose of increasing the rigidity of the solder.

7. A solder such as set forth in Claim 1, characterised by the addition of bismuth, for the purpose of increasing the fluidity of the solder.

8. A solder such as set forth in Claim 1, characterised by the addition of cadmium, for the purpose of increasing the fluidity of the solder.

9. The solders for aluminium substantially as described.

Dated this 11th day of August, 1919.

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